

To: Senate Budget Committee

From: Judith Curry

Re: Questions from Ranking Member Charles Grassley regarding the Hearing “Risky Business: How Climate Change is Changing Insurance Markets

Date: March 23, 2023

Question #1:

Dr. Curry, Senator Whitehouse asked questions regarding your 2014 Testimony to the Senate Committee on Environment and Public Works, more specifically the section entitled, "The IPCC AR5 WGI Report: A Weaker Case For Anthropogenic Global Warming." Can you clarify the nature of the IPCC AR5's "weaker case" and the role of natural climate variability?

My 2014 Testimony before the Senate Committee on Environment and Public Works compared statements made by the IPCC AR4 (2007) with the IPCC AR5 (2013), which led me to conclude that the AR5 presented a weaker case for anthropogenic warming than did the AR4.

The specific text that Senator Whitehouse referred to in my 2014 Testimony:

“However, several key elements of the AR5 WGI report point to a weakening of the case for attributing most of the warming to human influences, relative to the previous assessment AR4 (2007):

- Lack of warming since 1998 and the growing discrepancies between observations and climate model projections
- Evidence of decreased climate sensitivity to increases in atmospheric CO₂ concentrations
- Evidence that sea level rise during 1920-1950 is of the same magnitude as in 1993-2012
- Increasing Antarctic sea ice extent “

The relevant quotes from the IPCC AR5 that were included in my Testimony:

“[T]he rate of warming over the past 15 years (1998–2012) [is] 0.05 [–0.05 to +0.15] °C per decade which is **smaller** than the rate calculated since 1951 (1951–2012) [of] 0.12 [0.08 to 0.14] °C per decade.”

“. . . the **hiatus** [in warming] is attributable, in roughly equal measure, to a decline in the rate of increase in effective radiative forcing (ERF) and a cooling contribution from **internal variability** (expert judgment, medium confidence). The decline in the rate of increase in ERF is primarily attributed to natural (solar and volcanic) forcing but there is **low confidence** in quantifying the role of forcing trend in causing the hiatus, because of uncertainty in the magnitude of the volcanic forcing trend and low confidence in the aerosol forcing trend.”

“However, the implied rates of warming over the period from 1986–2005 to 2016–2035 are **lower as a result of the hiatus**: 0.10°C–0.23°C per decade, suggesting the AR4 assessment was near the upper end of current expectations for this specific time interval.”

“It is very likely that the mean rate of global averaged sea level rise was 1.7 [1.5 to 1.9] mm yr⁻¹ between 1901 and 2010, 2.0 [1.7 to 2.3] mm yr⁻¹ between 1971 and 2010 and 3.2 [2.8 to 3.6] mm yr⁻¹ between 1993 and 2010. **It is likely that similarly high rates occurred between 1920 and 1950.**”

“It is very likely that the annual Antarctic sea ice extent **increased** at a rate of between 1.2 and 1.8% per decade between 1979 and 2012.”

“There is **low confidence** in the scientific understanding of the observed increase in Antarctic sea ice extent since 1979, due to the incomplete and competing scientific explanations for the causes of change and low confidence in estimates of **internal variability**.”

The most fundamental source of disagreement regarding the theory of human- caused climate change is the importance of natural climate variability. Why do climate scientists disagree on the relative importance of natural versus human-caused climate change? The historical data is sparse and inadequate, particularly in the oceans. There is disagreement about the value of different classes of evidence, notably the value of global climate model simulations and paleoclimate reconstructions from geologic data. There is also disagreement about the appropriate logical framework for linking and assessing the evidence. And finally, there is little acknowledgment that some climate processes are poorly understood or even unknown.

Question #2:

Dr. Curry, Senator Whitehouse claimed you referred to the IPCC as "corrupt." Can you clarify the context of your statement, and summarize your concerns about the IPCC process? Is the IPCC a political body, and if so, what are the associated consequences of this politicization?

Senator Whitehouse requested whether I stood by my statement that the “IPCC is corrupt.” Senator Whitehouse completely misrepresented what I have said about the IPCC.

In a 2010 *Discover Magazine* interview, I made the following statement:

<https://www.discovermagazine.com/environment/an-inconvenient-provocateur>

“There is a substantial level of public interest in investigating the issues raised by Climategate. These issues include: wanting an assessment of the reliability and accuracy of the historical and paleo temperature records/reconstructions; wanting an **assessment of whether the IPCC was corrupted** and whether their conclusions are reliable and can be trusted as the basis for international carbon and energy policy; and whether there are some "bad apples" in the climate research community that need to be weeded out in the sense of not being in positions of responsibility as journal editor, IPCC lead author, administrator.”

This statement was subsequently exaggerated inappropriately in a 2010 *Scientific American* profile on me: <https://www.scientificamerican.com/article/climate-heretic/>

“Few scientists would claim the IPCC is perfect, but Curry thinks it needs thoroughgoing reform. She accuses it of “corruption.” “I’m not going to just spout off and endorse the IPCC,” she says, “because I think I don’t have confidence in the process.” “

A 2012 interview with oilprice.com made the following statement, which correctly reflects my concerns about the IPCC process.

<https://oilprice.com/Interviews/The-IPCC-May-Have-Outlived-its-Usefulness-An-Interview-with-Judith-Curry.html>

“Considered somewhat of a black sheep within the scientific community Judith was a one time supporter of the IPCC until she started to find herself disagreeing with certain policies and methods of the organization. She feared the combination of groupthink and political advocacy, combined with an ingrained "noble cause syndrome" stifled scientific debate, slowed down scientific progress, and corrupted the assessment process.”

Around the same time of these interviews, the UN InterAcademy Council began a thorough review of the IPCC’s policies and practices, in response to issues raised by Climategate. The UN IAC invited me make a presentation on my concerns. Also round the same time, the U.S. Natural Research Council Committee on Science, Engineering and Public Policy invited me to make a presentation on my concerns about the integrity of climate science in light of Climategate.

While the IPCC has instituted several of the changes recommended by the IAC, I remain very concerned about the politicization of the IPCC and how this impacts the integrity of climate research. For the past 15 years, I have been an advocate for the integrity of the scientific research. The overt politicization of the IPCC harms the scientific process and hence its progress, which in turn biases the knowledge base that is used by policy makers to support their decisions.

Question #3:

Dr. Curry, Senator Whitehouse claimed that climate models are performing accurately in their predictions. Can you summarize inadequacies of climate model projections cited in recent IPCC reports, and your own concerns?

Chapter 11 of the IPCC AR5 Report¹ focused on near term climate change, through 2035. Figure 11.25 compares climate model projections with observations of global surface temperature anomalies through 2012.

¹ https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter11_FINAL.pdf

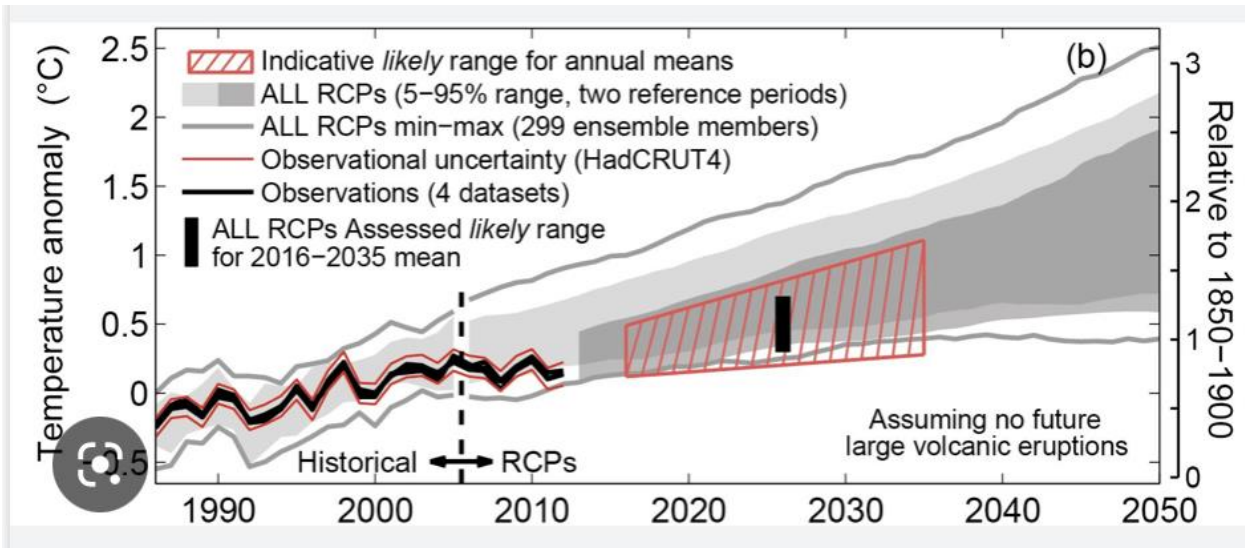
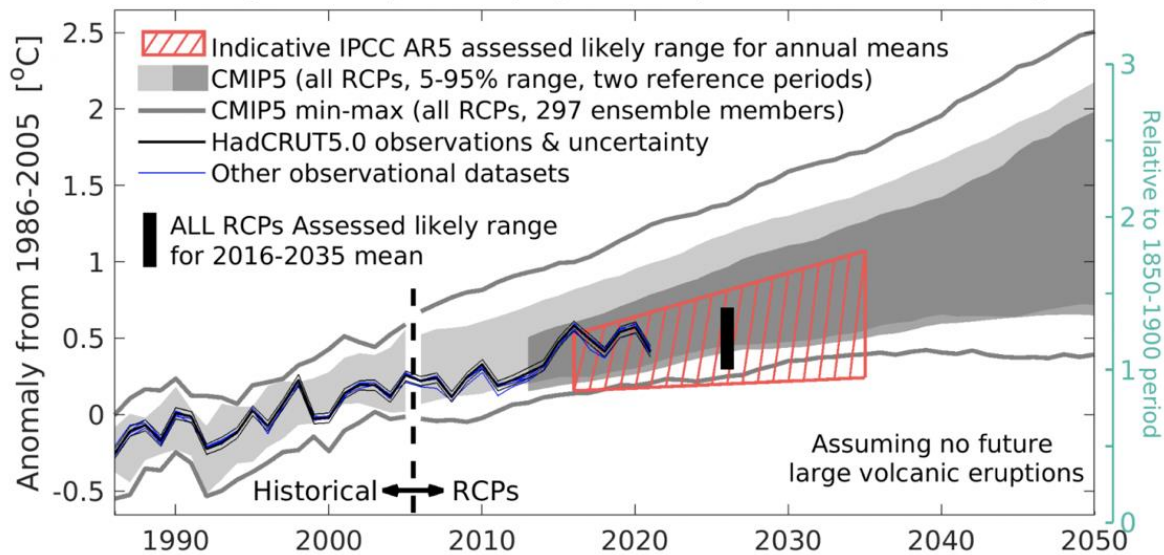


Figure 11.25 in the IPCC AR5 shows that near term climate projections for the period 1999 - 2012 have been much warmer than the observed temperatures, with several years dropping below the 5-95% envelope of the climate model simulations.

Ed Hawkins is the IPCC author who prepared Figure 11.25. He updated the Figure with temperatures through 2021. This later period included the extremely warm temperatures associated with the super El Nino in 2016. The year 2016 barely made it to the midpoint of the climate model range; compare 2016 with 1998 (a previous super El Nino, which slightly exceeded the upper boundary of the 5-95% range).

CMIP5 near-term global temperature projections: updated from IPCC AR5 Fig. 11.25



On average, the CMIP6 climate models used in the IPCC AR6 are running hotter than the CMIP5 models cited above. As a result, the IPCC AR6 procedure for providing projected estimates of global average temperature change over the 21st century diverged markedly from the AR4 and AR5, which had relied totally on simulations from global climate and Earth-system models, equally weighting all climate model simulations that were submitted.

The CMIP6 models used by the AR6 overall provided substantially more warming than the CMIP5 models used in the AR5, including some models with values of climate sensitivity that were judged to be unrealistically high. Hence, the AR6 constrained the CMIP6 projections with observational constraints on simulated past warming and best estimates of the climate sensitivity to increased CO₂. The reduction of the constrained projections relative to the original CMIP6 simulations reported by the AR6 (AR6 Figure 4.11) is substantial, up to 20 percent for the higher emissions scenarios.

There is a growing realization that global climate models are not fit for the purpose of predicting twenty-first century climate variations and change, particularly on decadal and regional scales. Climate model simulations under the auspices of the CMIP program and the IPCC are not providing the full range of scenarios of plausible climate outcomes. The CMIP simulations include very limited scenarios of volcanic eruptions and solar variability. Further, the climate models have inadequate representations of solar indirect effects and multi-decadal to century scale variations in the large-scale ocean circulations. Natural internal climate variability is of particular importance for scenarios of regional climate variations, with larger uncertainties than at the global scale. Uncertainties are substantially larger for global model simulations of precipitation. The coarse resolution of global climate models means that they are not able to simulate directly extreme weather events such as temperature extremes, floods, hurricanes, etc.